Sweetpotatoes Pack Potent Protection

Sweetpotatoes earned U.S. producers about $395 million in 2008—and they're packed with carotenoids, vitamin C, potassium, and fiber. Now Agricultural Research Service (ARS) scientists have found that they also contain high levels of protective phenolic compounds called "caffeoylquinic acids." These compounds, which are known for their antioxidant activity, are found in many plants, though the levels vary widely.

ARS agronomist Howard Harrison teamed up with plant pathologist Pat Wechter and plant physiologist Joseph Peterson (now retired) to measure the levels of caffeoylquinic acids in sweetpotatoes. All three scientists work at the U.S. Vegetable Laboratory in Charleston, South Carolina. Other ARS collaborators included ARS chemists Maurice Snook and Trevor Mitchell, who work at the Richard B. Russell Research Center Toxicology and Mycotoxin Research Unit in Athens, Georgia.

The scientists assessed the levels of four types of caffeoylquinic acids in 16 sweetpotato varieties from the United States, Brazil, and Africa. They also studied caffeoylquinic acids in bigroot morningglory, a sweetpotato relative with roots that can weigh more than 60 pounds.

The research team found measurable amounts of all four types of caffeoylquinic acids in the sweetpotatoes they tested. On average, the highest levels of the compounds were found in the layer of tissue just under the skin. Intermediate levels were found in the stele—the interior of the sweetpotato—and the lowest levels were found in the skin. Bigroot morningglory roots also had high levels of all four of the defensive compounds.

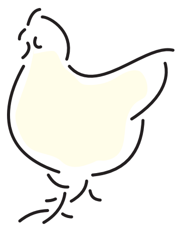
The scientists found that three of the compounds they tested provided some protection against *Rhizopus* soft rot, a fungus that infects sweetpotatoes after harvest by invading through breaks in the skin. All of the compounds inhibited growth of plant-infecting bacteria, and one inhibited another infectious plant fungus, *Fusarium solani*.

The team noted that the compound levels varied significantly among the sweetpotato varieties they evaluated, despite the study's small sample size. "If we screened a larger sweetpotato germplasm collection, we'd probably find varieties with even higher compound levels," Harrison says. He thinks that plant breeders may be able to use the compounds as biochemical markers to develop sweetpotato varieties with enhanced pest resistance and other beneficial traits.—By **Ann Perry,** ARS.

Howard Harrison is in the USDA-ARS U.S. Vegetable Laboratory, 2700 Savannah Hwy., Charleston, SC 29414; phone (843) 402-5300 ext. 5323, fax (843) 573-4715, e-mail howard.harrison@ars.usda.gov. ✷

"Seeing" Poultry Carcass Contamination

Agricultural Research Service scientists Kurt Lawrence, Bosoon Park, Bob Windham, and Seung-Chul Yoon—all in the Quality and Safety Assessment Research Unit in Athens, Georgia—have made two improvements to a hyperspectral imaging system used to scan the surface of poultry carcasses for contaminants. They have refined the system so that it can detect even tiny amounts of fecal contamination, which can vary significantly depending on where in the digestive tract it originated. They have also developed and implemented a new image-processing method to identify and remove false-positive readings.



To facilitate the transfer of their system, a prototype on-line multispectral imaging system was installed and tested in a commercial poultry plant to detect fecal-contaminated carcasses. The system was developed through a research agreement with Stork Gamco, a manufacturer of poultry-processing equipment based in Gainesville, Georgia. Carcasses were imaged after evisceration but before washing, at a rate of 150 birds per minute.

"The system ran for several days with no hardware or software problems, and it demonstrated the feasibility of accurately detecting fecal-contaminated carcasses," says Lawrence.

The Athens team is collaborating with agricultural engineer Kevin Chao and biophysical scientist Moon Kim at the Beltsville Agricultural Research Center's Environmental Microbial and Food Safety Laboratory, who developed an on-line imaging system to differentiate systemically diseased poultry carcasses from wholesome ones.

The ARS groups and their industry partner are now merging the fecal-detection and diseased-carcass-detection systems onto a common platform that includes a line-scan hyperspectral imaging camera, lighting, and operating and detection software. Merging the two systems will aid in commercialization by creating one interchangeable imaging system that can be installed in different locations of the processing line to solve two separate and significant problems in the poultry processing industry. This will allow processors to more easily integrate such a system into their operations.

"We are currently modifying our system to work on the camera system used by the Beltsville group," says Lawrence. "Our goal is to have the new prototype tested by the end of 2009."—By **Sharon Durham,** ARS.

Kurt Lawrence is in the USDA-ARS Quality and Safety Assessment Research Unit, Richard B. Russell Research Center, 950 College Station Road, Athens, GA 30605; phone (706) 546-3527, fax (706) 546-3607, e-mail kurt.lawrence@ars.usda.gov. ✷